

Figure 1: overall image analysis method

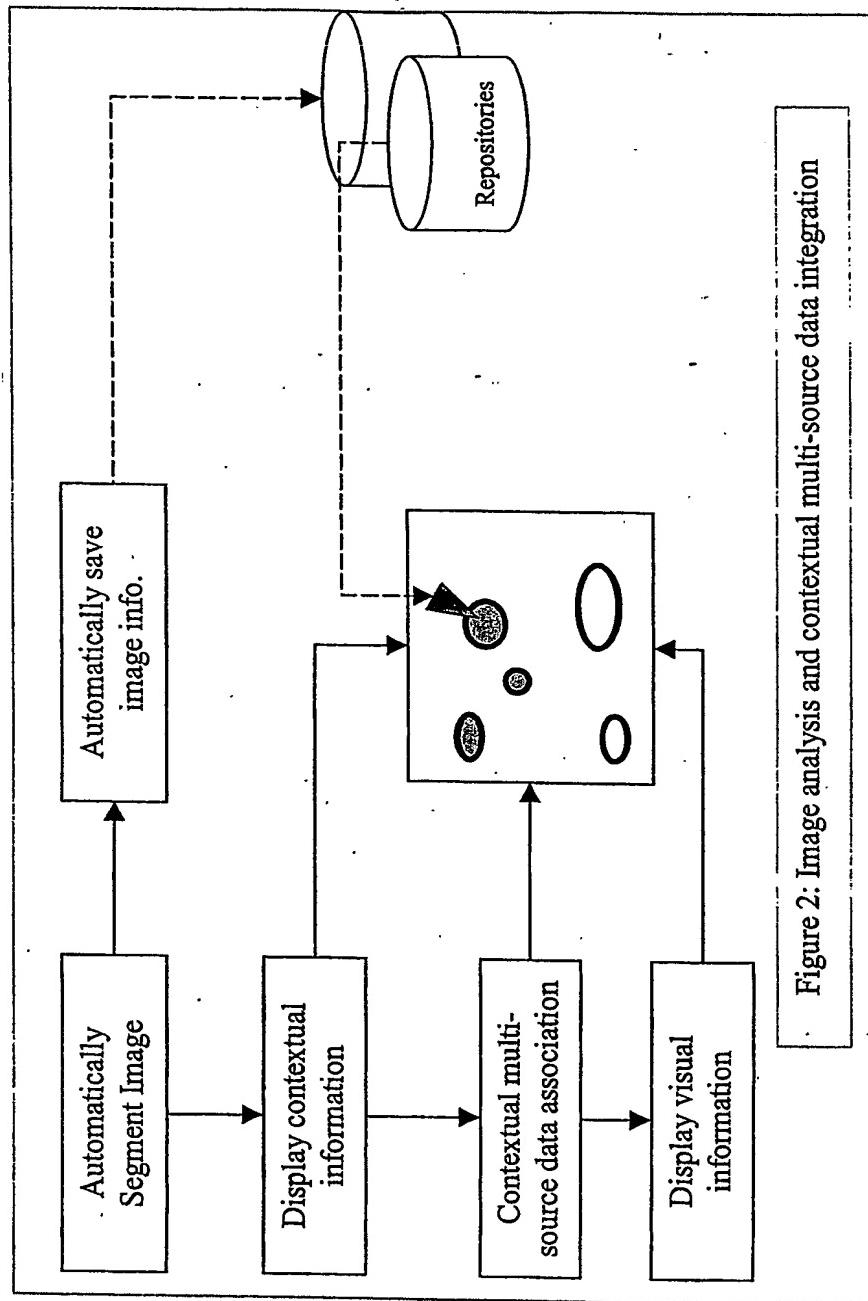


Figure 2: Image analysis and contextual multi-source data integration

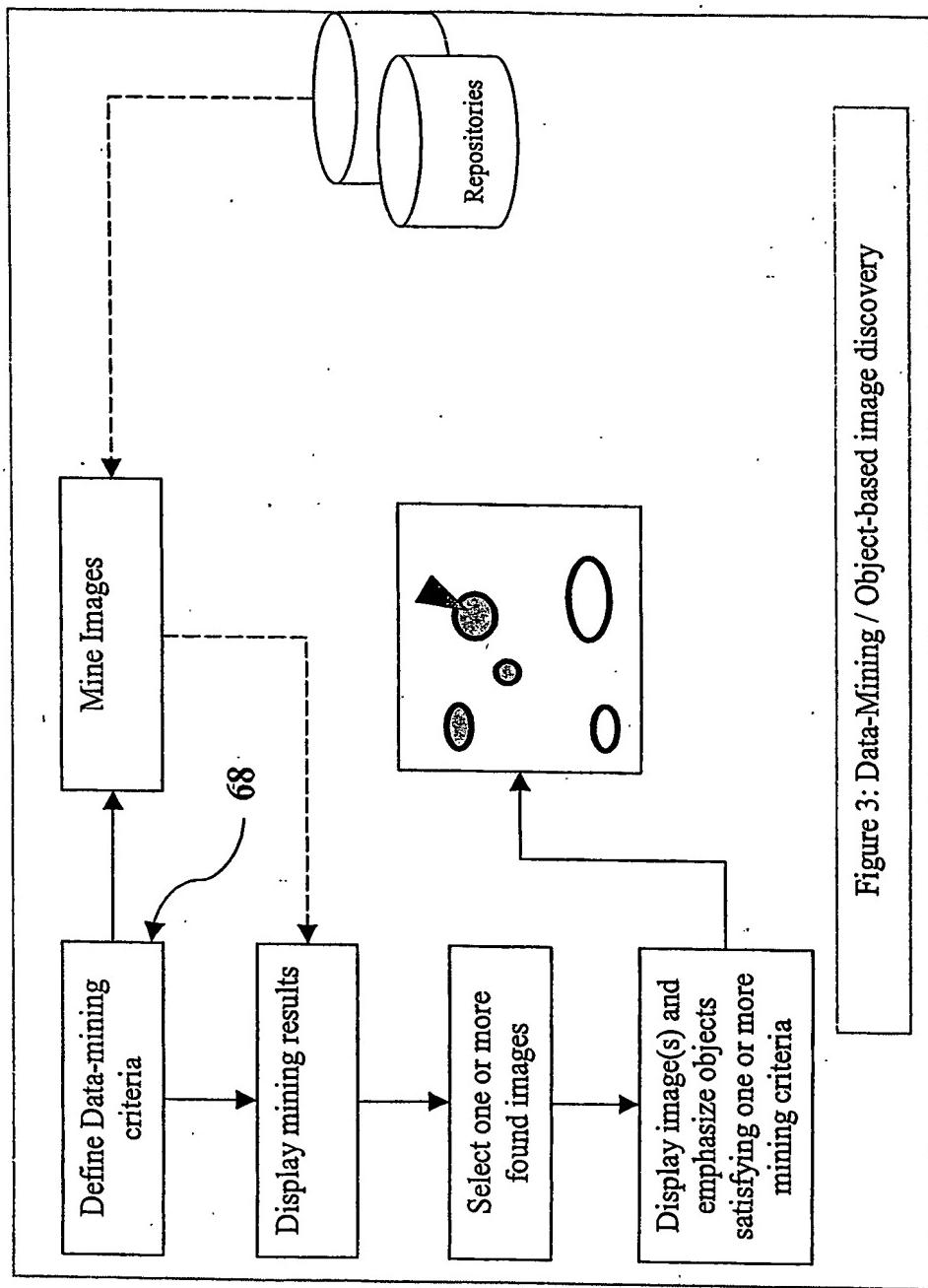
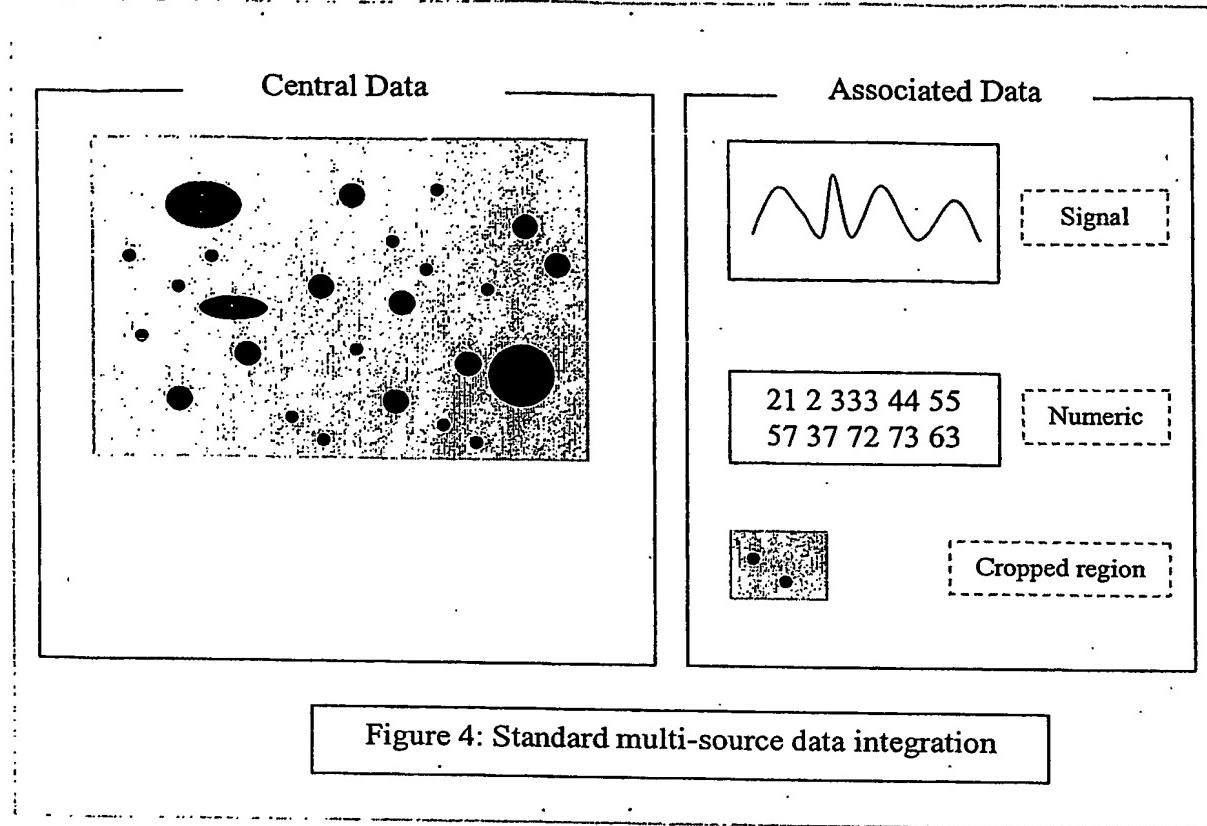


Figure 3: Data-Mining / Object-based image discovery



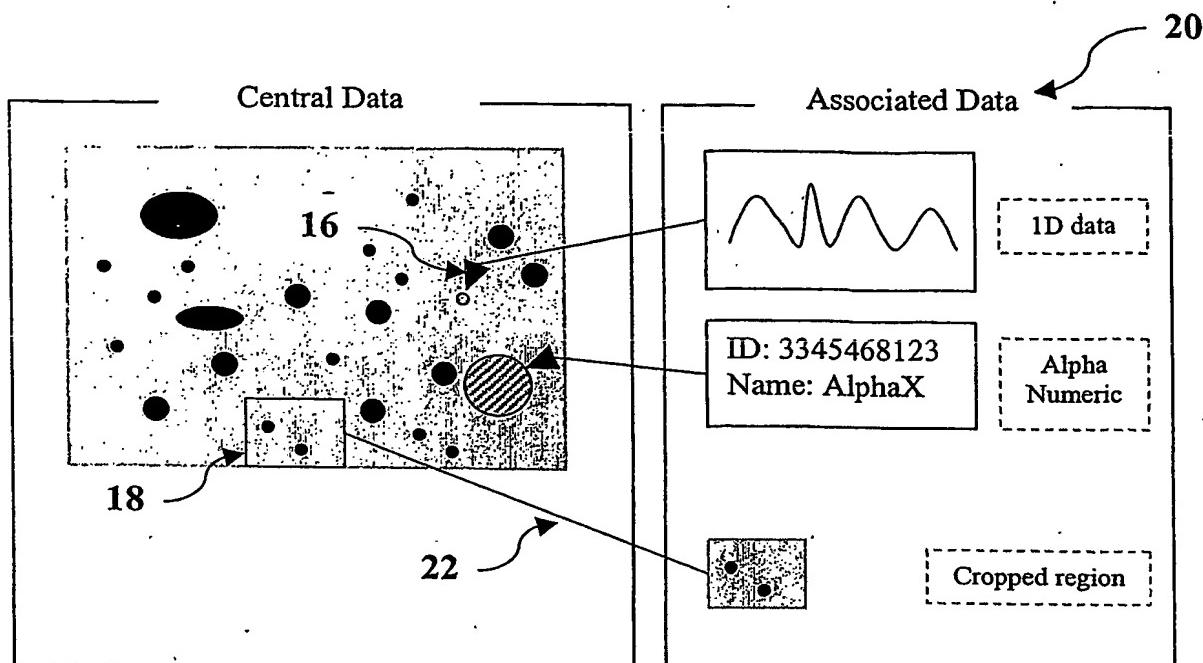


Figure 5: contextual multi-source data integration

Figure 6: Interactive ROI selection

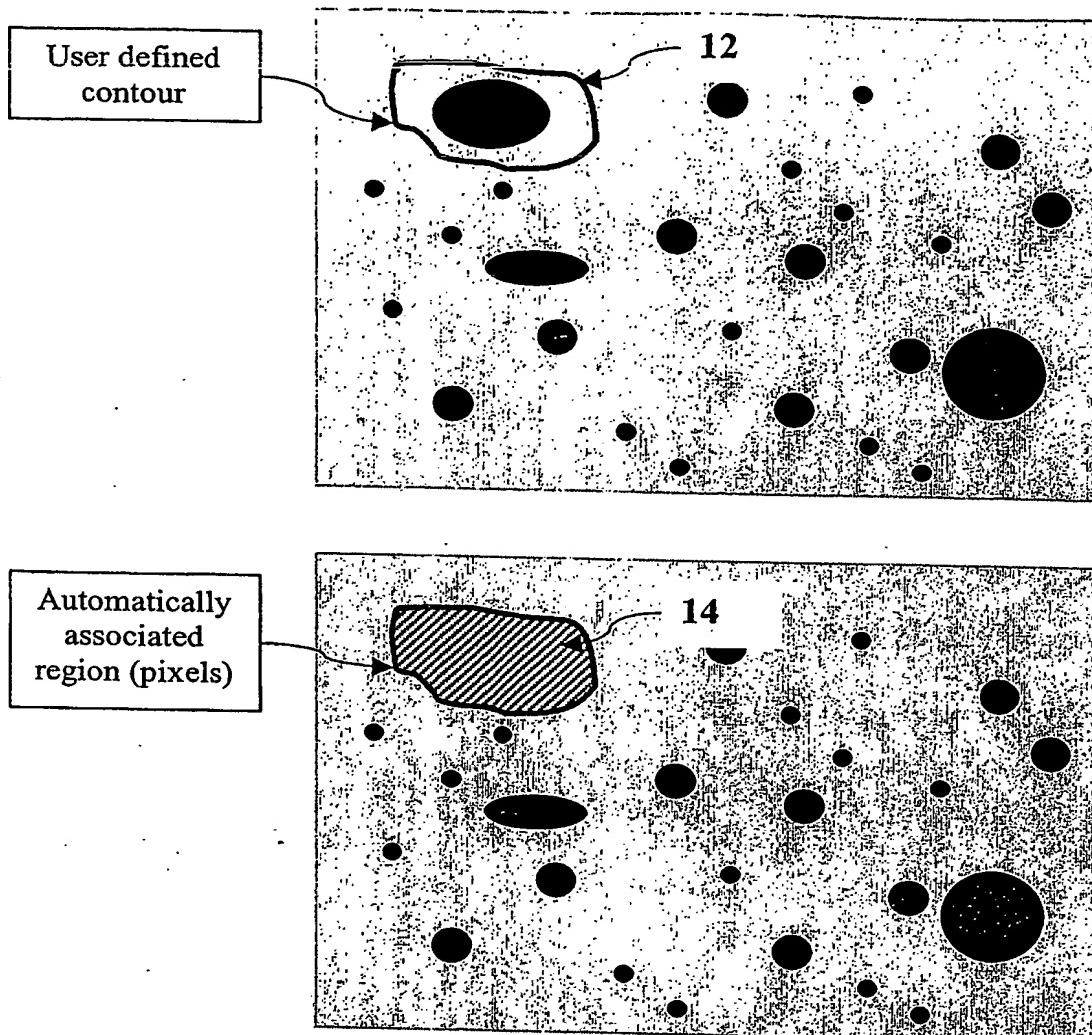
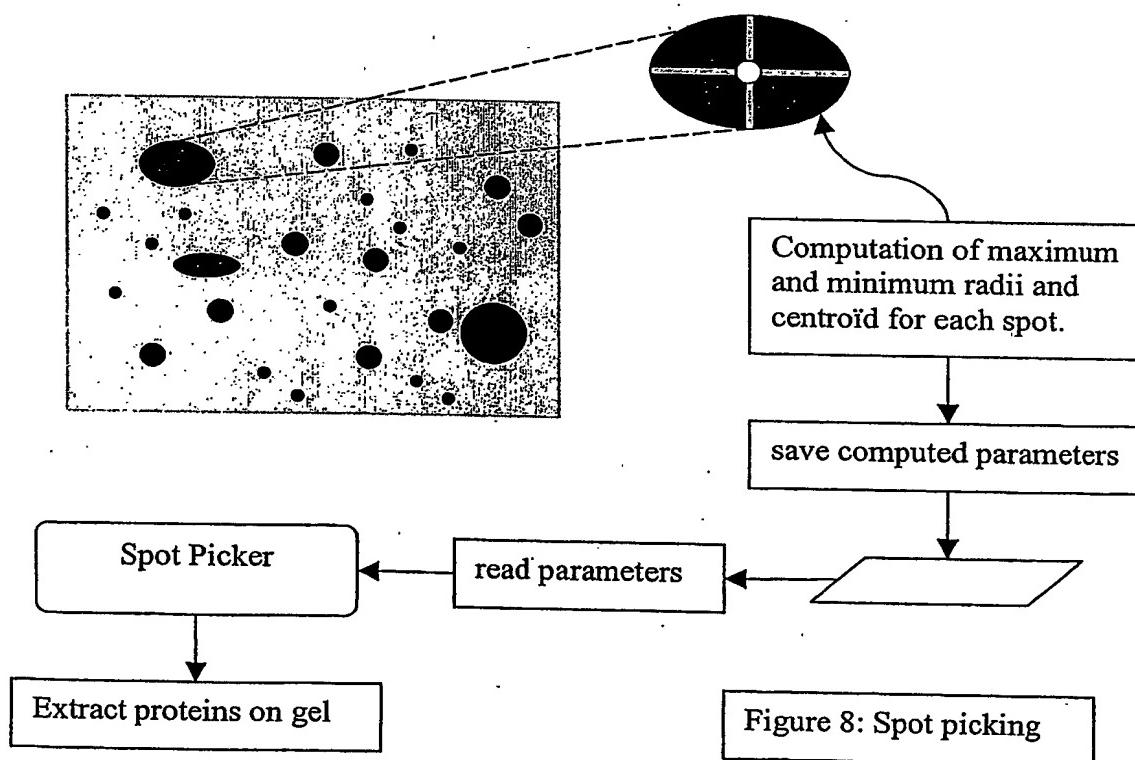
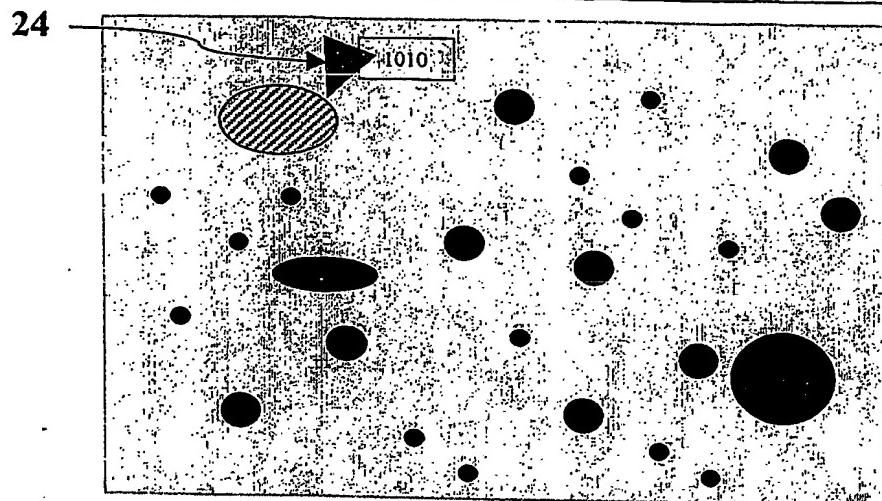


Figure 7: Other visual indication of data association



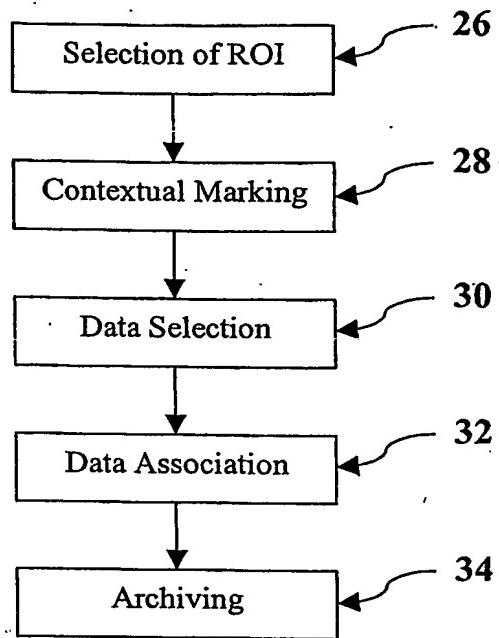


Figure 9: General flow of contextual data association

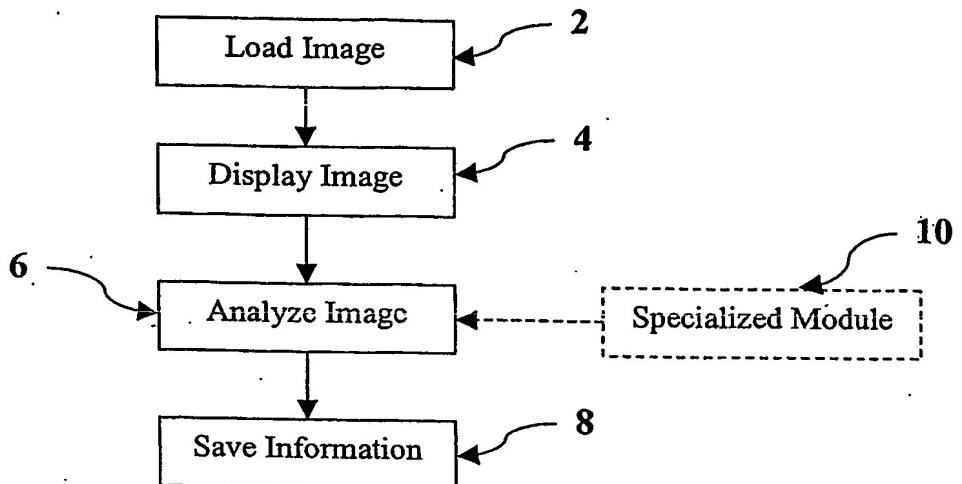
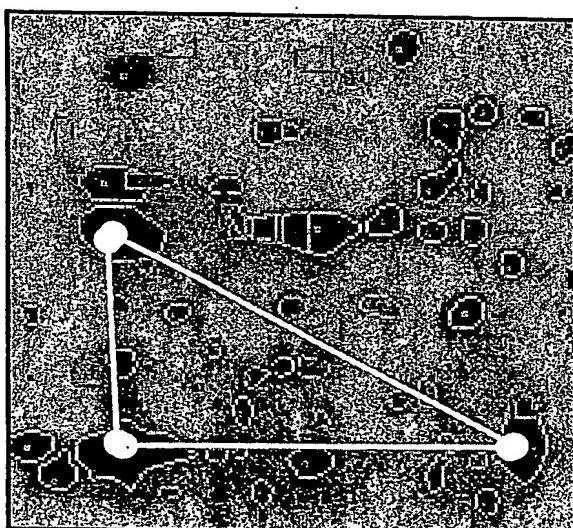


Figure 10: Basic image analysis Operational Flow



Discovered images		
Name	Location	Similarity
<u>Image 11</u>	//images	97%
<u>Image 93</u>	//images	94%
<u>Image 261</u>	//images	91%

Discovered images with possible pathology X (Signature X)

Click on image name to display image

Figure 11: Image data-mining and discovery results display in tabular form

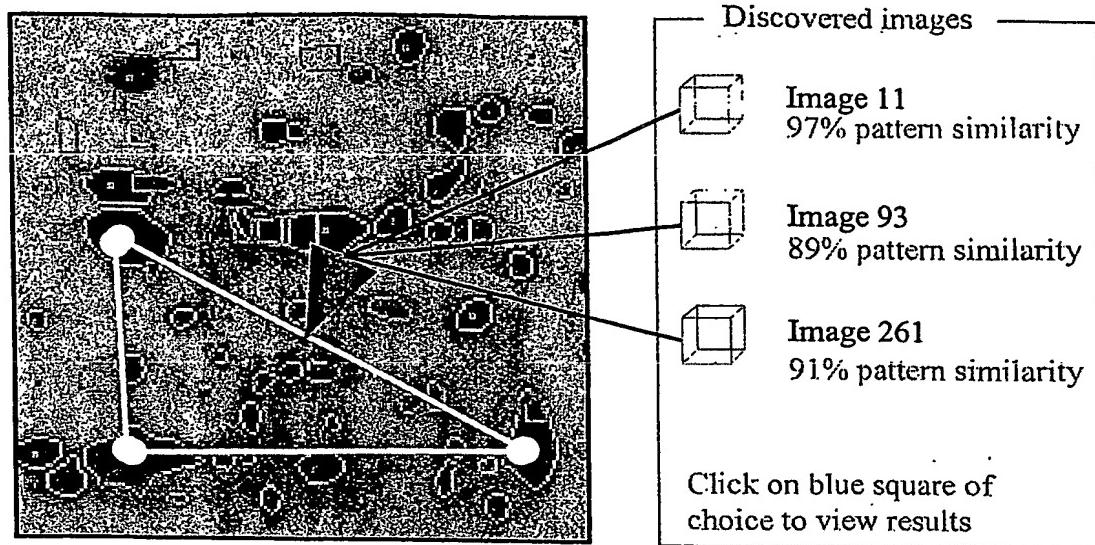


Figure 12: Image data-mining and discovery results display with visual associative links

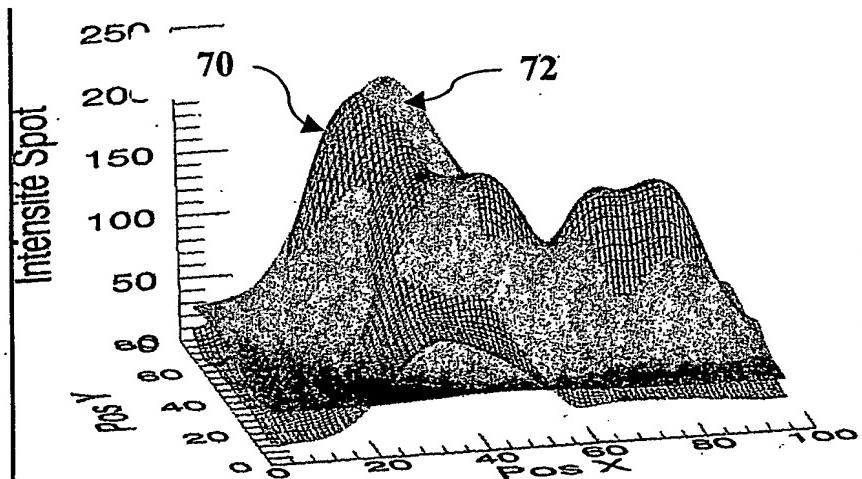


Figure 13: Simulated spots using diffusion functions

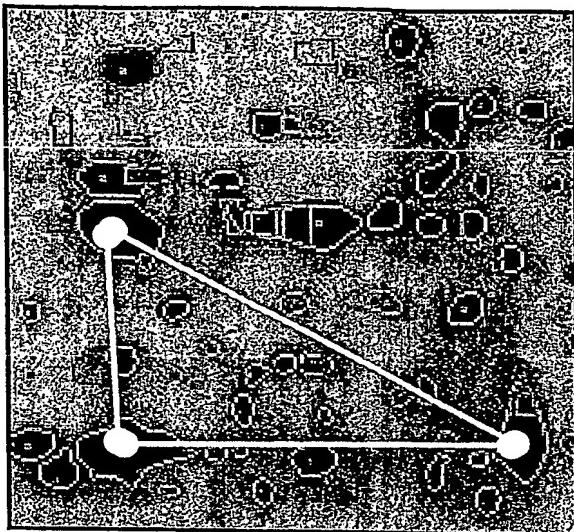


Figure 14: Example of multi-spot (protein) pattern

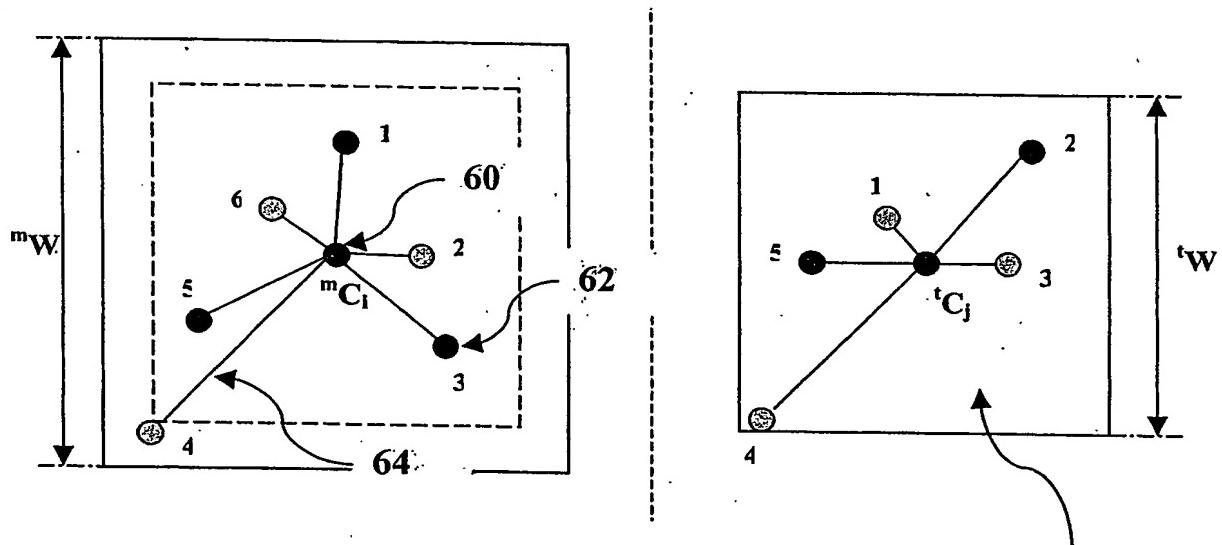


Figure 15: Pattern based image matching

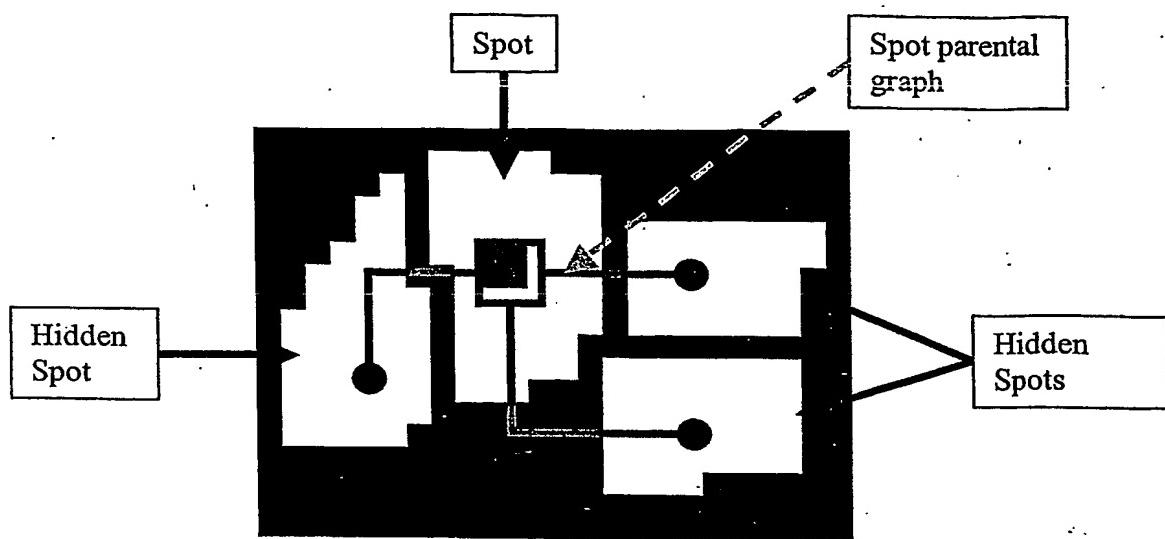
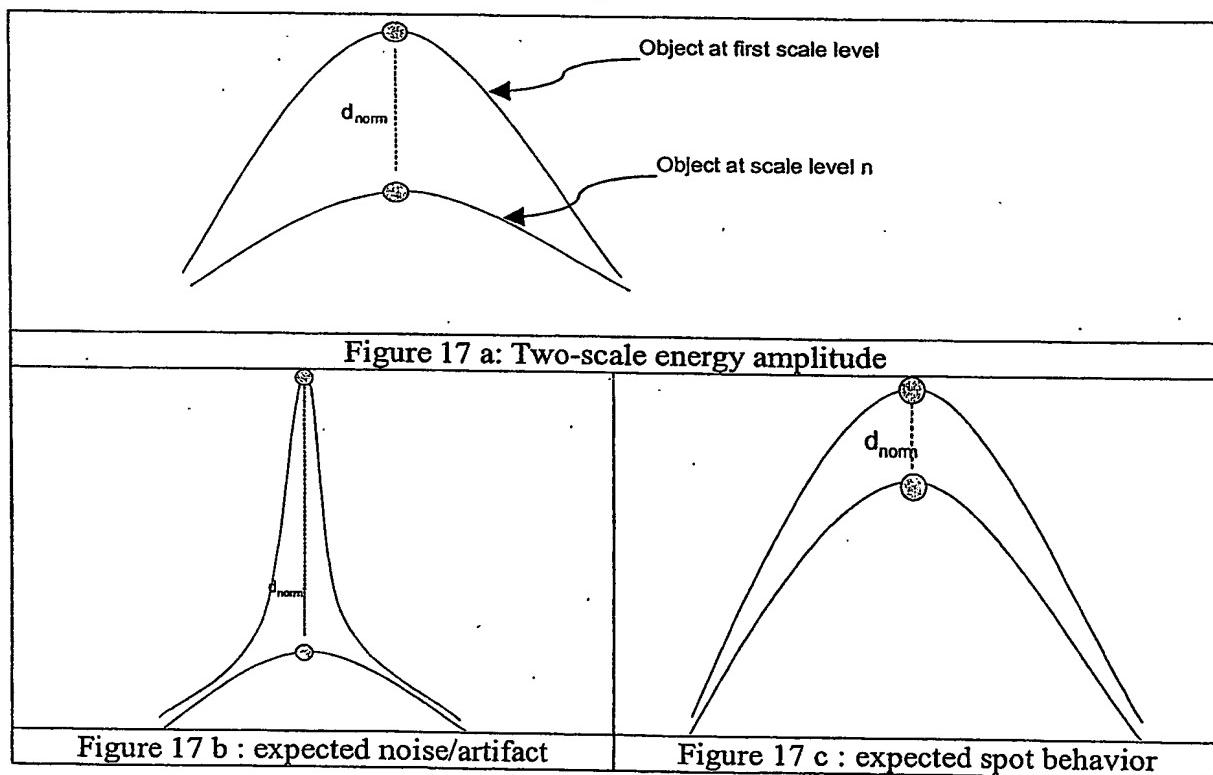


Figure 16: Hidden spot parental graph



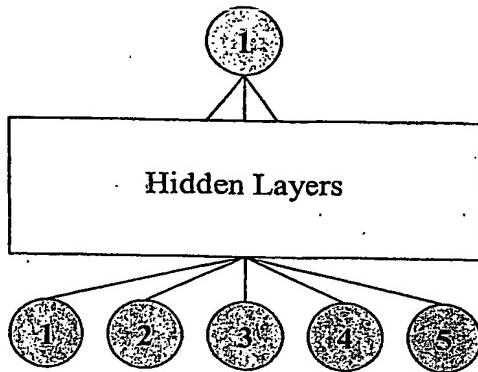


Figure 18: Simple Neural Network classifier

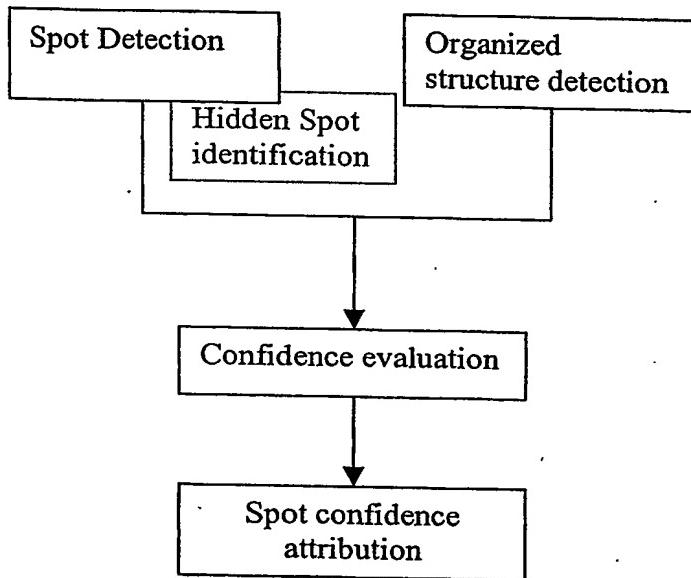
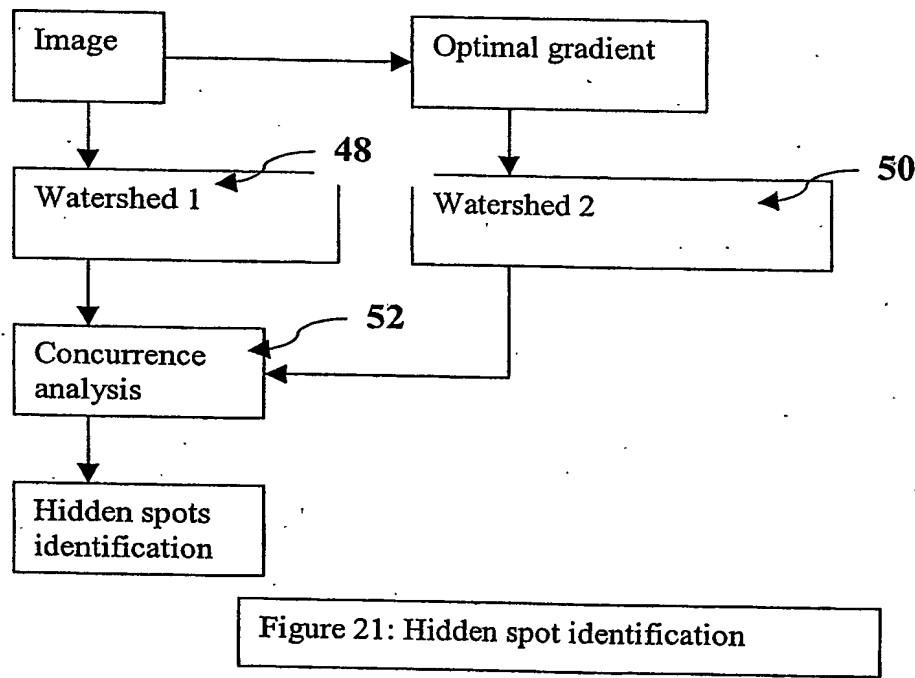
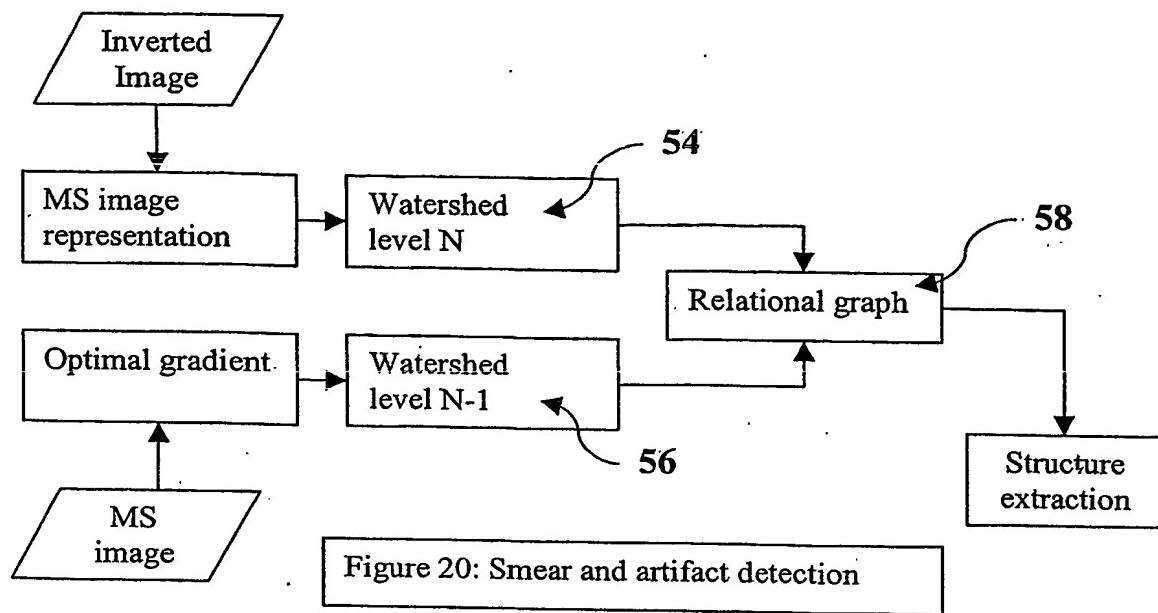


Figure 19: Spot confidence attribution process



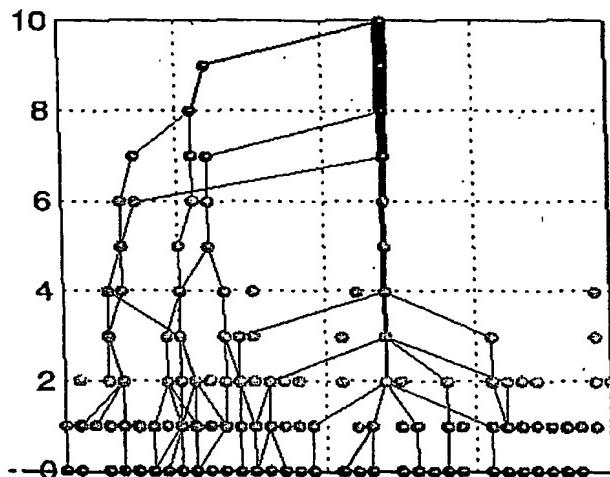
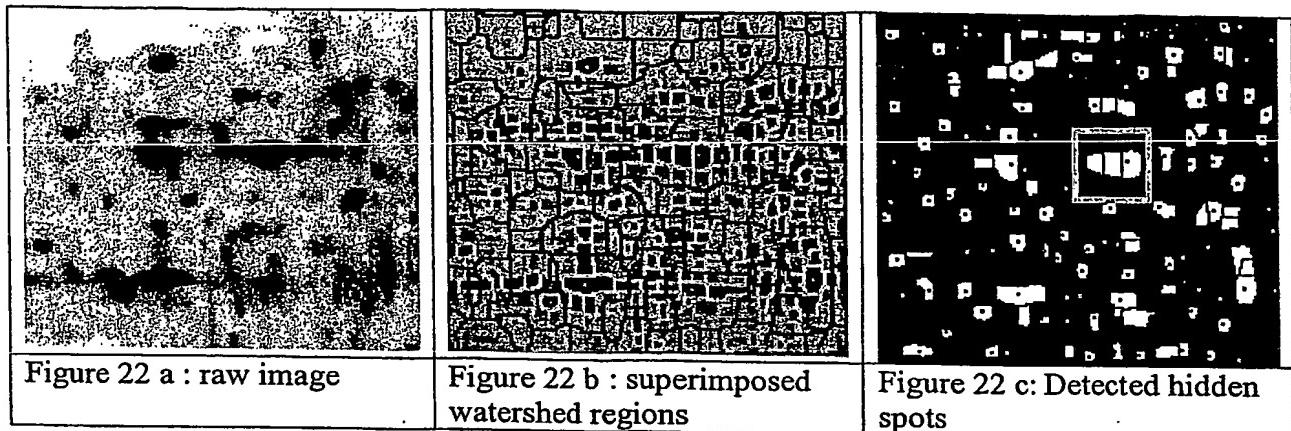


Figure 23: Profile view of Multiscale event tree

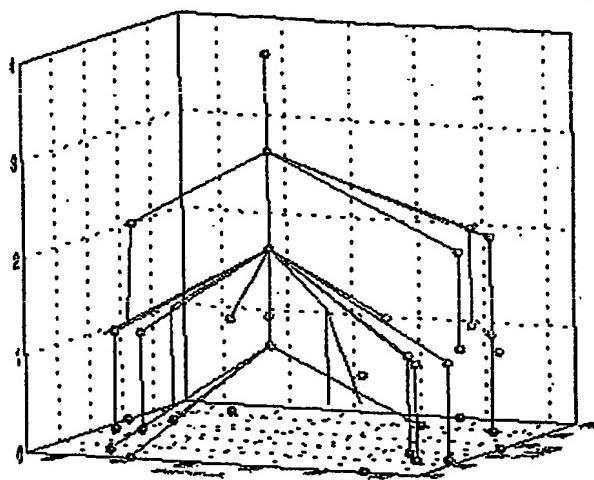


Figure 24: Typical 3D view of multiscale event tree of a spot

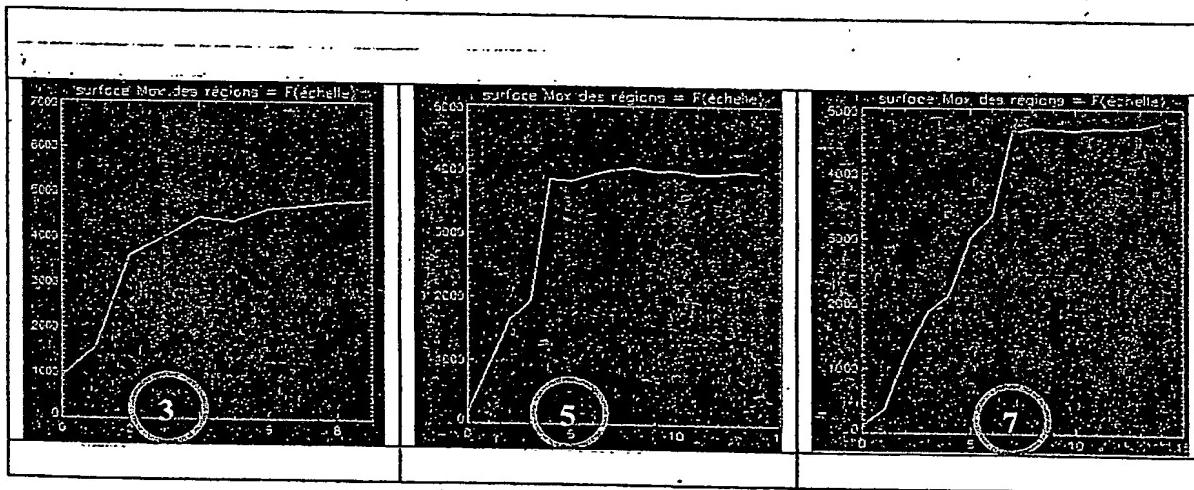
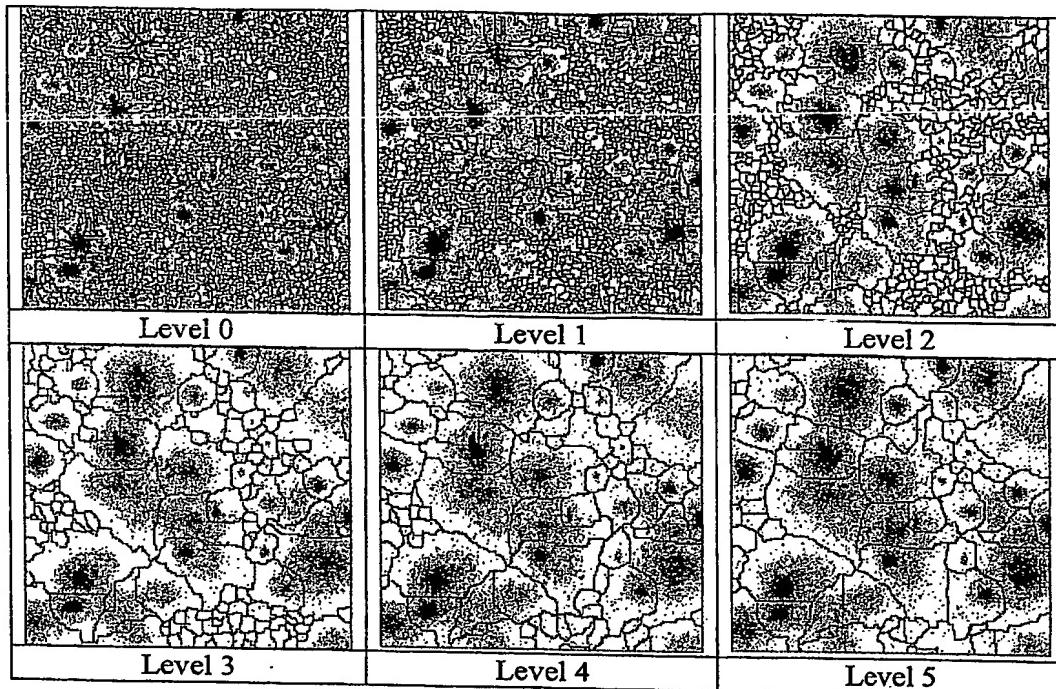
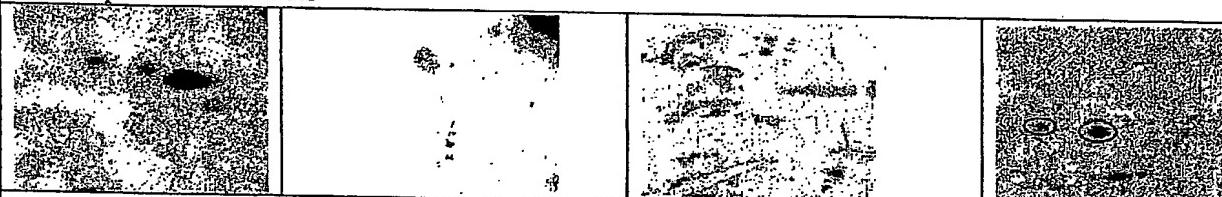


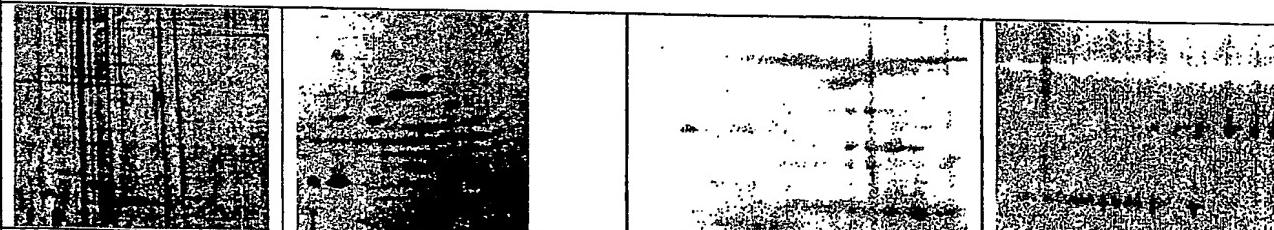
Figure 25 : Watershed regionalization of spot image at multiple scale levels
(multiscale image regionalization).



26 a : Spots and artifacts



26 b : Smear lines



26 c : Variable background

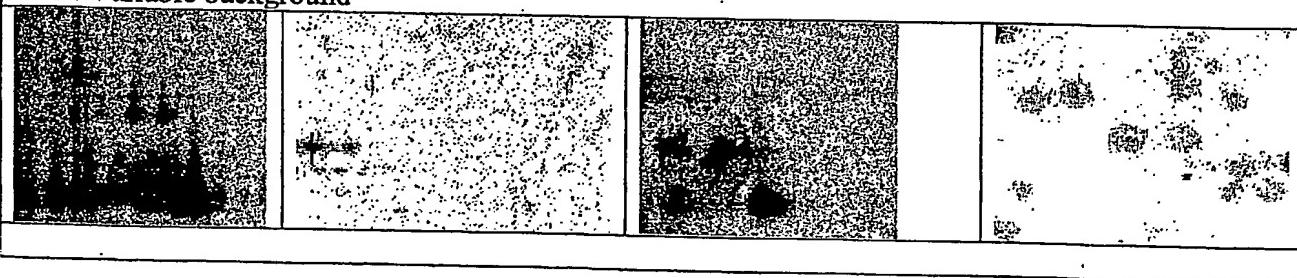


Figure 26 : Typical image variations

Eq. 1 : Poisson distribution

$$P(x) = \frac{\mu^x e^{-\mu}}{x!}$$

Eq. 2 : Gaussian modeled spot

$$G(\bar{x}, S) = \frac{1}{2\pi\sqrt{|S|}} \exp\left[-\frac{1}{2} \bar{x}^T S^{-1} \bar{x}\right], \text{ with } S = \begin{pmatrix} \sigma_x^2 & \rho\sigma_x\sigma_y \\ \rho\sigma_x\sigma_y & \sigma_y^2 \end{pmatrix}, \text{ where rho represents}$$

the x,y correlation coefficient.

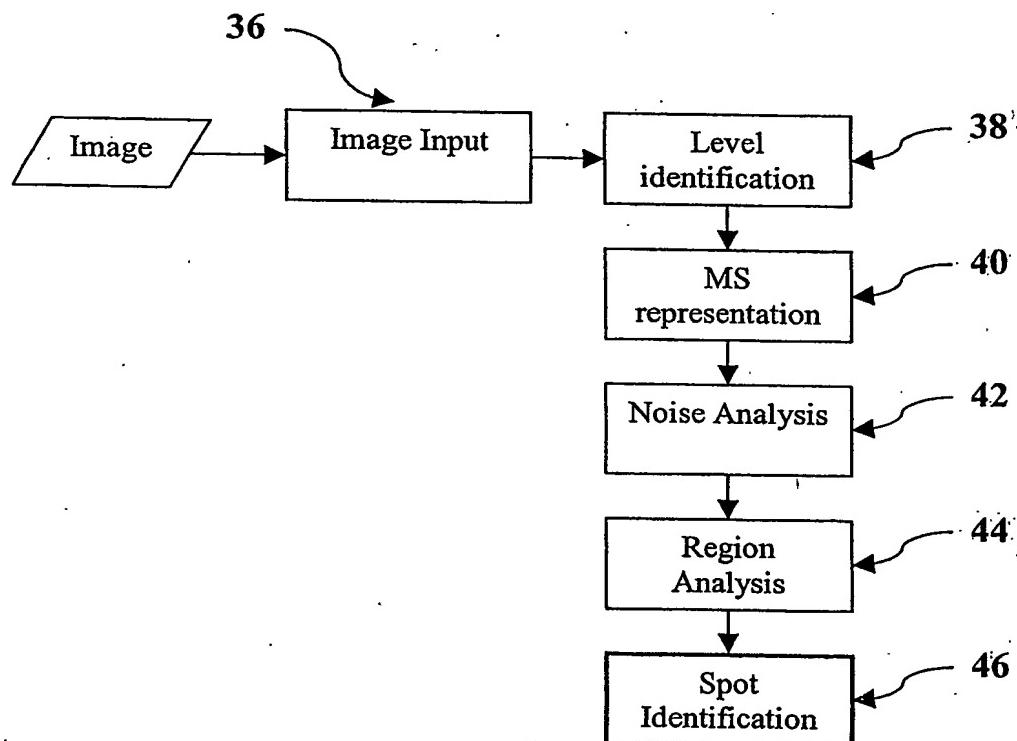


Figure 27: Overall spot identification process

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